CLAIMS

1. A method of allocating resources in a network having multiple resource-allocation layers and in which a first layer requires resources provided by a second of said layers, the method comprising the steps of:

at said first layer, providing an indication to the second layer of said required resources to be allocated from said second layer;

at said second layer automatically offering said required resource together with a condition for use of those resources; and

at said first layer determining if the condition for use of the offered resources is acceptable and, if so, automatically accepting the offered resources from the second layer.

2. A method as claimed in claim 1, wherein said condition includes a price for use of said offered resources.

3. A method according to claim 2 additionally comprising the step of:

varying said price responsive to said request and to availability of said resources.

4. A method according to claim 1 wherein said price acceptability is determined by said first layer according to a pre-determined allocation policy.

5. A method according to claim 3 additionally comprising the step of:

monitoring a characteristic effect of said allocation policy;

varying said allocation policy responsive to said characteristic.

6. A method as claimed in claim 3, wherein said network incorporates a multi-wavelength transport layer.

7. A method as claimed in claim 6, wherein traffic ingress to said multi-wavelength transport layer is controlled via a virtual port.

8. A method as claimed in claim 7, wherein said virtual port provides access to a plurality of real ports one for each wavelength transported on the multi-wavelength transport layer.

9. A method as claimed in claim 8, wherein said virtual port distributes traffic to said real ports so as to balance the loading of the real ports.

10. A method as claimed in claim 9, wherein an ingress control of said virtual port advertises an ingress access price for bandwidth use in the multi-wavelength transport layer.

11. A method as claimed in claim 10, wherein the ingress control of said virtual port allocates ingress traffic to one or more individual wavelengths in the multi-wavelength transport layer according to a current bandwidth price for access to the multi-wavelength transport layer.

12. A method as claimed in claim 11, wherein said multi-wavelength transport layer provides supertrunks between ingress and egress ports.

13. A method of allocating resources in a communications network having a hierarchy of transport layers, each said layer having its own resource capacity, the method comprising; determining within a said layer whether that layer has sufficient resources to support a request for service, and, where insufficient resources are available, automatically requesting further resources from one or more other said layers.

14. A method as claimed in claim 13, wherein a demand oriented price for requested resource use is determined by each said layer, and wherein said price is offered by that layer to any other layer requesting use of that resource.

15. A method as claimed in claim 14, wherein allocation of resources from one layer to another is determined by a customer willingness to pay the current price for those resources.

16. A method as claimed in claim 15 wherein the network resources are allocated so as to provide substantially uniform resource use both horizontally across each said layer and vertically over said hierarchy of layers.

17. A method of managing a communications network having a multi-layer hierarchical structure in which each layer of the hierarchy can provide a transport

service to one or more other layers, the method comprising negotiating between said layers to determine a network resource allocation and a resource price to be offered to a customer for admission to the network and utilisation of said resource allocation.

18. A method as claimed in claim 17, wherein a demand oriented price for requested resource use is determined by each said layer, and wherein said price is offered by that layer to any other layer requesting use of that resource

19. A method of managing a communications network having a multi-layer hierarchical structure in which each layer of the hierarchy can provide a transport service to one or more other of said layers, the method comprising negotiating automatically between said layers to determine a network resource allocation and a resource price to be offered to a customer for admission to the network and utilisation by the customer of said resource allocation.

20. A communications network having a multi-layer hierarchical structure in which each layer of the hierarchy can provide a transport service to one or more other of said layers, and having a management arrangement for negotiating automatically between said layers to determine a network resource allocation and a resource price to be offered to a customer for admission to the network and utilisation by the customer of said resource allocation.

21. A layered resource-allocation system comprising:

a first layer comprising a topology manager arranged to provide an indication of required resources and an indication of willingness to pay for said required resources;

a second layer comprising a service manager arranged to provide said resources responsive to a comparison between said willingness to pay and a price of said required resources.

22. A communications network having multiple resource-allocation layers and incorporating a resource allocation management structure for allocating resources requested by a first layer of said layers from a second of said layers, the management structure being arranged to perform the steps of:

at said first layer, providing an indication to the second layer of said required resources to be allocated from said second layer;

at said second layer automatically offering said required resource together with a condition for use of those resources; and

at said first layer determining if the condition for use of the offered resources is acceptable and, if so, automatically accepting the offered resources from the second layer.

23. A communications network having multiple resource-allocation layers and incorporating a resource allocation management structure for allocating requested resources between said layers, said network including a multi-wavelength transport layer to which controlled access is provided via one or more virtual ports, wherein each said virtual port provides access to a plurality of real ports one for each wavelength transported on the multi-wavelength transport layer, and wherein aid virtual port distributes traffic to said real ports so as to balance the loading of the real ports.

24. A network as claimed in claim 23, wherein an ingress control of said virtual port advertises an ingress access price for bandwidth use in the multi-wavelength transport layer.

25. A network as claimed in claim 24, wherein the ingress control of said virtual port allocates ingress traffic to one or more individual wavelengths in the multi-wavelength transport layer according to a current bandwidth price for access to the multi-wavelength transport layer.

26. A network as claimed in claim 25, wherein said multi-wavelength transport layer provides supertrunks between ingress and egress ports.

27. A multi-layer communications network, comprising an upper Internet protocol (IP) layer, a multi-protocol label switched (MPLS) layer, a synchronous transport (SDH) layer, and an underlying multi-wavelength optical transport layer, wherein each said layer has a respective manager arranged to manage resources within that layer, to respond to requests for service from other layer managers, to set a price for those service requests, and to request service from the other layer managers, and wherein an interlayer manager responsible for controlling the resource allocation and resource pricing of each said layer manager so as to optimise use of the resources within each said layer.

28. A network as claimed in claim 27, wherein traffic ingress to said multi-wavelength transport layer is controlled via a virtual port.

29. A network as claimed in claim 28, wherein said virtual port provides access to a plurality of real ports one for each wavelength transported on the multi-wavelength transport layer.

30. A network as claimed in claim 29, wherein said virtual port distributes traffic to said real ports so as to balance the loading of the real ports.

31. A network as claimed in claim 30, wherein an ingress control of said virtual port allocates ingress traffic to one or more individual wavelengths in the multi-wavelength transport layer according to a current bandwidth price for access to the multi-wavelength transport layer.

32. A network as claimed in claim 31, wherein said multi-wavelength transport layer provides supertrunks between ingress and egress ports.

33. Software in machine readable form for allocating resources in a communications network having a hierarchy of transport layers, each said layer having its own resource capacity, the software being arranged to perform the method of: determining within a said layer whether that layer has sufficient resources to support a request for service, and, where insufficient resources are available, automatically requesting further resources from one or more other said layers.